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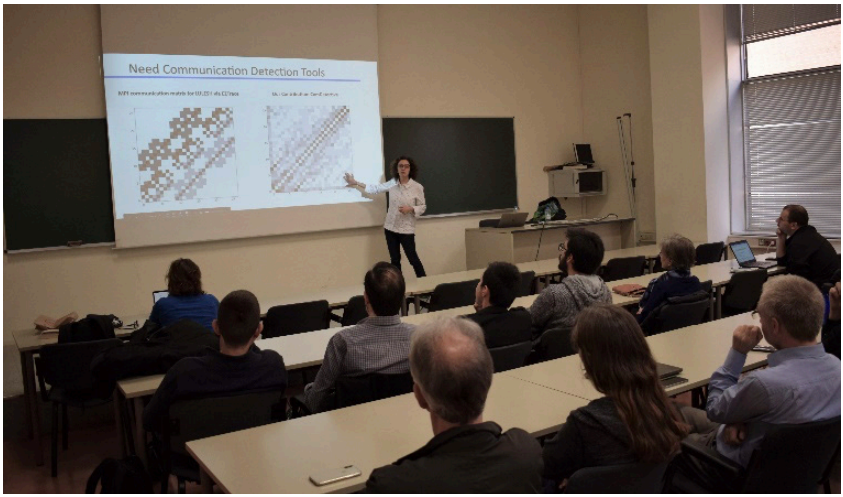
A Lightweight Tool for Detecting Inter-Thread Communication

Didem Unat
Koç University

Abstract

In a multicore environment, inter-thread communication can provide valuable insights about application performance. Literature detecting inter-thread communication either employs hardware simulators or binary instrumentation. Those techniques bring both space and time overhead, which makes them impractical to use on real-life applications. Instead, we take a completely different approach that leverages hardware performance counters and debug registers to detect communication volume between threads. The information generated by our tool can be utilized in several places to guide optimizations, understand performance behavior, and compare architectural features. In this talk, I present the design details of our tool along with experimental results on small to very large applications. I would like to note that this work is nominated for the best paper and the best student paper at SC19.



Short bio

Didem Unat is an Assistant Professor at Koç University, Istanbul, Turkey. She is known for her work in designing programming models, performance tools, and runtime systems for emerging parallel architectures with over 30 publications and 500+ citations in this area. During her Ph.D. at the University of California San Diego (UCSD), she designed and developed the Mint Programming Model to facilitate GPU programming. She later received the prestigious and highly competitive Luis Alvarez Postdoctoral Fellowship from the Lawrence Berkeley National Laboratory (LBNL). During her postdoc at LBNL, she developed the ExaSAT performance analysis framework for co-designing Exascale machines. Since 2014 she leads her own Parallel and Multicore Computing group at Koç University as an independent PI. She is the recipient of the Marie Sklodowska-Curie Individual Fellowship from the European Commission in 2015 and the Young Scientists Award in 2019 from the Science Academy of Turkey.